According to one aspect of the present invention as defined by claim 1, a method for inerting an aircraft fuel tank is provided. The method comprising the steps of: (a) contacting compressed air with one or more first membrane modules at conditions effective to produce a first nitrogen-enriched air stream; (b) introducing said first nitrogen-enriched air stream into said fuel tank during periods of low demand for nitrogen-enriched air; (c) contacting compressed air with one or more second membrane modules at conditions effective to produce a second nitrogen-enriched air stream; and (d) introducing said second nitrogen-enriched air stream into said fuel tank during periods of high demand for nitrogen-enriched air. Said first membrane modules have a lower O_2 permeance and a higher O_2/N_2 selectivity than said second membrane modules. At least one of said first nitrogen-enriched air stream and said second nitrogen-enriched air stream is introduced directly into the fuel in said fuel tank at conditions effective to liberate at least a portion of dissolved O_2 in the fuel. Additional aspects of the present invention are defined by independent claims 14, 25 and 31.

Edwards et al does not disclose or suggest each feature of the presently claimed invention. For example, the inventive methods according to claims 1 and 14 include introducing a nitrogen-enriched air stream directly into a fuel in a fuel tank at conditions effective to liberate at least a portion of dissolved O_2 in the fuel. Similarly, the inventive systems according to claims 25 and 31 include a conduit for introducing a retentate stream directly into a fuel in a fuel tank to liberate at least a portion of dissolved O_2 in the fuel. *Edwards et al* has no disclosure or suggestion of such features. In fact, *Edwards et al* has no disclosure or suggestion of introducing a nitrogen-

enriched air stream directly into a fuel in a fuel tank[1], let alone at conditions effective to liberate at least a portion of dissolved O_2 in the fuel.

Like *Edwards et al*, *Ginsburgh et al* fails to disclose or suggest introducing a nitrogen-enriched air stream directly into a fuel in a fuel tank at conditions effective to liberate at least a portion of dissolved O_2 in the fuel. In fact, *Ginsburgh et al* has no recognition or suggestion of the presence of dissolved oxygen in the fuel, let alone introducing a nitrogen-enriched air stream directly into the fuel at conditions effective to liberate a portion of such dissolved oxygen. Moreover, the Official Action fails to provide any reason why one of ordinary skill in the art would have been motivated to modify *Edwards et al* and/or *Ginsburgh et al* to introduce a nitrogen-enriched air stream directly into a fuel in a fuel tank at conditions effective to liberate at least a portion of dissolved O_2 in the fuel.

Furthermore, the inventive methods and systems include a first membrane module which produces nitrogen-enriched air employed during periods of low demand thereof, which has a lower O_2 permeance and a higher O_2/N_2 selectivity than a second membrane module which produces nitrogen-enriched air employed during periods of high demand thereof. Advantageously, the present invention enables the use of a membrane module having a higher O_2 permeance and a lower O_2/N_2 selectivity (i.e., the second membrane module) to provide an increased nitrogen-enriched air flow rate during periods of higher nitrogen-enriched air demand.

Edwards et al does not disclose or suggest such a feature. In this regard, *Edwards et al* discloses that "portion 88 could provide one purity product and portion 90 could provide another

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[1]This deficiency of *Edwards et al* is acknowledged at page 2 of the Official Action.

purity product from the same feed" (*Edwards et al* at col. 7, lines 33-36). However, *Edwards et al* has no recognition or suggestion of employing nitrogen-enriched air produced by a first membrane module having a lower O_2 permeance and a higher O_2/N_2 selectivity in comparison with a second membrane module, during periods of low demand of nitrogen-enriched air.

Rather, *Edwards et al* discloses providing an increased nitrogen-enriched air flow rate by using a portion of a permeator with a "higher capacity", or by utilizing flows from two portions of the permeator (*Edwards et al* at col. 11, lines 50-55). Absent an improper resort to Applicants' own disclosure, one of ordinary skill in the art would not have been motivated to select a first membrane module which provides nitrogen-enriched air for use during periods of low demand thereof, which has a lower O_2 permeance and a higher O_2/N_2 selectivity than a second membrane module which provides nitrogen-enriched air for use during periods of high demand thereof. Further, *Ginsburgh et al* does not even relate to the use of membrane modules for producing nitrogen-enriched air, let alone the O_2 permeance and O_2/N_2 selectivity characteristics of such membrane modules, and as such fails to cure the above-described deficiency of *Edwards et al*.

Accordingly, for at least the reasons set forth above, withdrawal of the §103(a) rejection over *Edwards et al* and *Ginsburgh et al* is respectfully requested.

Claims 4, 5-10, 12, 15, 16, 18, 19-21, 23, 26-28 and 31 stand rejected under 35 U.S.C. §103(a) as being obvious over *Edwards et al* in view of *Ginsburgh et al*, and further in view of "Aviation Week and Space Technology", Vol. 147, No. 2, pp. 60-61 (*Dornheim*). Withdrawal of this rejection is respectfully requested for at least the following reasons.

The deficiencies of *Edwards et al* and *Ginsburgh et al* are discussed above.

The Examiner relies on *Dornheim* for disclosing that "oxygen enrichment occurs from the dissolved air in the fuel" (Official Action at page 3). However, like *Edwards et al* and *Ginsburgh et al*, *Dornheim* fails to disclose or suggest introducing a nitrogen-enriched air stream directly into a fuel in a fuel tank at conditions effective to liberate at least a portion of dissolved O_2 in the fuel. In stark contrast with the present invention, *Dornheim* discloses the use of a centrifugal aspirator/scrubber to reduce the amount of oxygen dissolved in incoming fuel during refueling. There is simply no disclosure or suggestion that introducing a nitrogen-enriched air stream directly into a fuel in a fuel tank is effective to liberate at least a portion of dissolved O_2 in the fuel.

In this regard, the Official Action at page 3 states the following:

> To substitute particular parameters and conditions in the fuel inherting [sic] system of Edwards et al in place of unspecified conditions are considered to have been a matter of design and engineering choice in order to achieve the desired performance of the system in a particular situation.

Applicant's respectfully disagree with the Examiner's position. It is noted that the Patent Office must show that the prior art teaches or suggests all the claim limitations in order to establish a *prima facie* case of obviousness.[2] However, in the present case, not one of the applied documents has any recognition or suggestion of introducing a nitrogen-enriched air stream directly into a fuel in a fuel tank at conditions effective to liberate at least a portion of dissolved O_2 in the fuel.

Furthermore, like *Edwards et al* and *Ginsburgh et al*, *Dornheim* fails to disclose or suggest a first membrane module which produces nitrogen-enriched air employed during periods of low demand thereof, which has a lower O_2 permeance and a higher O_2/N_2 selectivity than a

[2]See, e.g., M.P.E.P. §2143.

second membrane module which produces nitrogen-enriched air employed during periods of high demand thereof.

Accordingly, for at least the reasons set forth above, withdrawal of the §103(a) rejection over *Edwards et al*, *Ginsburgh et al* and *Dornheim* is respectfully requested.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited. If the Examiner has any questions concerning this paper, or the application in general, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

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Date: July 1, 2002